Airman Willie L. Hill, Jr. poses with his Super Sonic Soarer. Ektachrome transparency by A1C Charles A. Chisley.

SUPER SONIC SOARER

A LARGE, LIGHTWEIGHT THERMAL-SNIFFING GLIDER FOR SINGLE OR MULTI-CHANNEL.

By WILLIE L. HILL

The Super Sonic Soarer has been designed to satisfy the need of the newcomer to radio control glider flying who wishes to start with a large enough model to handle the present day radio gear and launching methods. This ship will accept engines in the smaller power size for docile power launches or a slightly larger motor to really put it up where the eagles dare to fly. It is docile at almost any height. The original Super Sonic Soarer was flown single channel only, however, other versions of the model have been flown with rudder and elevator controls. Needless to say, it retains much of its same flying characteristics with either type control. Although designed specifically for teaching the beginner the finer points of glider flying, this model is no pushover and could stand up equally well against the latest thermal glider design. The particular model presented in this article is a result of several years of experimentation and modification.

CONSTRUCTION:

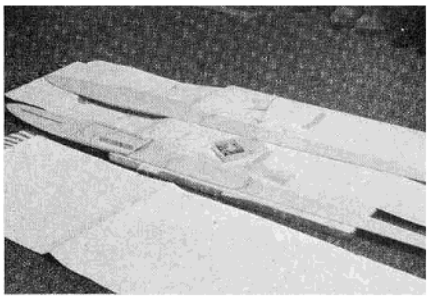
Holding true to its purpose, all construction is down to a minimum of difficulty and could be handled by the rawest of beginners. First of all, I will have to say that handpicking the wood is essential in constructing your model. If you have not done this before it is quite an experience and could determine the final results of a strong and rugged aircraft that will be around for more and more of your accidental crashes. Start constructing the fuselage by splicing two 3/32" sheets together to cover the entire length of the fuselage side. Follow the same procedure for the other side, then cut out identical forms. At this time, the reinforcing braces R1 through R5 can be glued to the sides of the fuselage. Simply take a strip of 1/8" x 3/8" balsa and cut the required lengths of strip. Before applying the rails for the servo, take the servo and place it in position on the plans to see exactly where the rails for your particular unit will be positioned, then glue them into place.

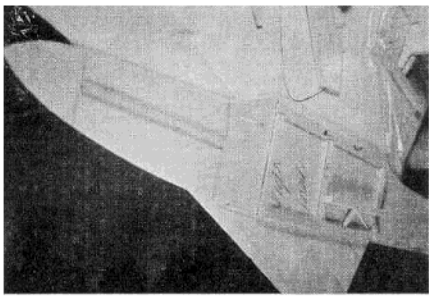
Next, cut out each former to the outline on the plans. If you desire to beef up the fuselage construction, then substitute 1/8" sheeting formers for 1/16" sheeting, cut formers No. 1 and No. 3 from 3/32" plywood sheeting, and add a former down strip R2. Since F3 and F4 are of equal width, glue these two formers to one side of the fuselage sheeting and let dry. Once dried, join the fuselage sides by pinning the tail together, then glue the formers to the other side. Make sure that your fuselage

sides are carefully aligned. After this simple task, the remaining formers can be added. In the meantime, a pushrod for the control linkage can be made out of a ¼" diameter dowel and 1/16" diameter wire. When you have the control rod shaped and you have estimated the position at which it will be aligned, start planking the bottom of the fuselage with 3/32" sheeting. Do this crosswise instead of lengthwise to assure a stronger body. Now, before planking the top of the fuselage, glue in position the 3/16" diameter dowels for the wing; the 1/16" diameter dowels for the stabilizer; and the plywood stab mounts. After this has been taken care of, start the planking of the top, omitting the section over the ballast area which can be done after balancing the plane to the correct center of gravity.

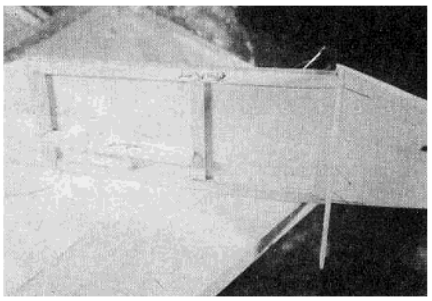
The wing is very easy to construct, and if you follow the directions closely you will have a very durable structure. With the one main panel given on the plans, you can build both a right and left panel. Now, I think the most tedious job of any model construction is cutting out the ribs for the wing. And, needless to say, I get my X-Acto knife, sandpaper, and Excedrin tablets together, oh, and don't forget the oil vassel, because it's gonna be a long, painful night! (Yes, I do hate to cut ribs!) Cut out all of the wing ribs from 1/16" sheeting after making a plywood template of the master rib shown on the plans. Trace this template's outline with a fine point ball point pen on the sheet of balsa, then cut these ribs out with your knife. After all of the standard size ribs are cut out, stack them together, block them up at their leading and trailing edges and pin all of the ribs into one bundle. Sand this bundle to the exact outline of the master rib with medium fine sandpaper. This will assure that all of the ribs are the correct airfoil shape and size. For the tapered tip panel of the wing, individual templates are not necessary unless you intend to build at least two of the models, therefore, draw the outline of the rib on the wood, cut out the rib, then retrace it on the wood again. Do this for all of the tapered ribs and you will spend less time on this section of the wing.

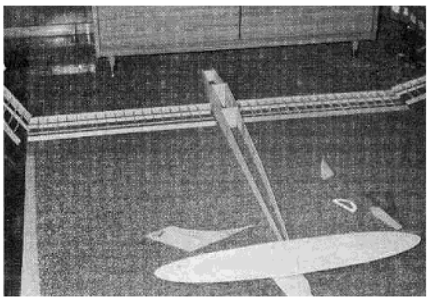
Next, pin down the tapered ¼" x 1" trailing edge in place over the plans. Before placing the trailing edge down, slot the strip to accept the ribs. Cut a 1½" wide strip of planking from 1/16" sheeting for the leading edge. From a stock strip of 5/16" square balsa, cut it to the length of the leading edge. Glue



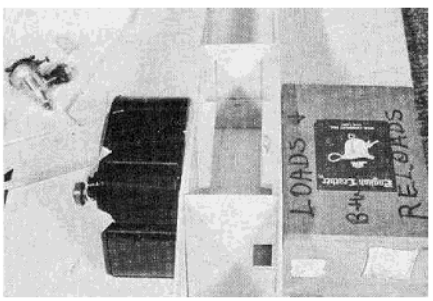


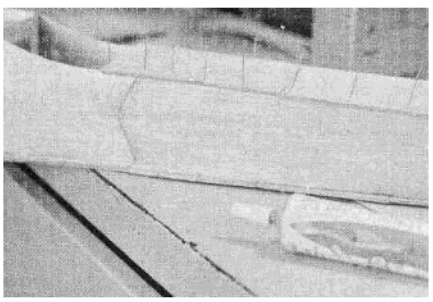
Left: The fuselage receiving its splicing cuts. Right: In the foreground is the R/C gear floor support rails and, in the background, the reinforcement frame with its built–in servo mount rail.



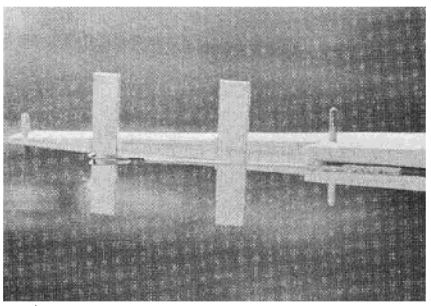


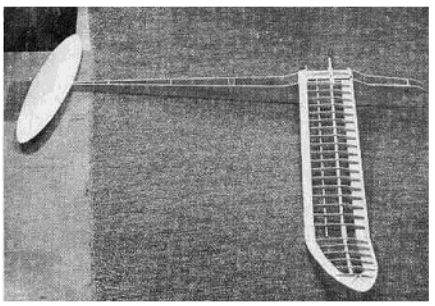
Left: This is a better view of the servo mount rail which will support the servo floor. Right: My roommate said, "Hill, there's only room for two of us. Either you or that thing has got to go." I wonder why he said that?



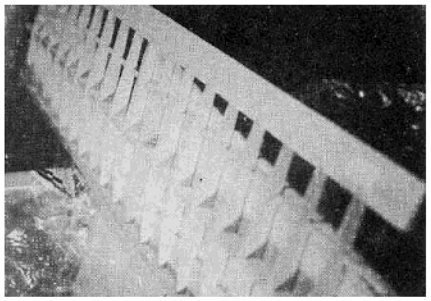


Left: The fuselage of the "Super Sonic Soarer" is getting the vise treatment as it is braced on both sides by a bulk film loader and a cologne box during drying. Right: Shown is top planking for fuselage.

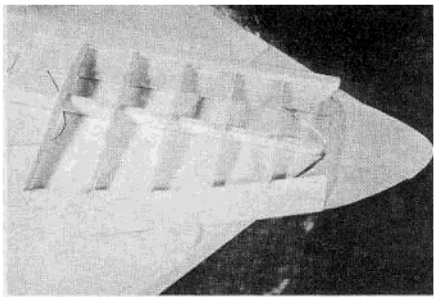




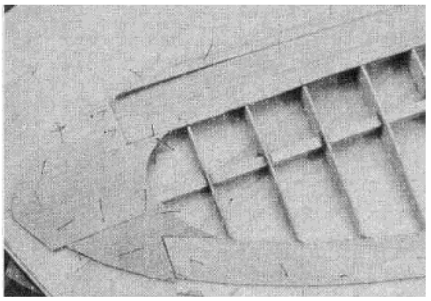
Left: Detail of stabilizer mounts. Right: If there is a biologist in the house, I guess you'd call this bisecting, um–m, Doc???



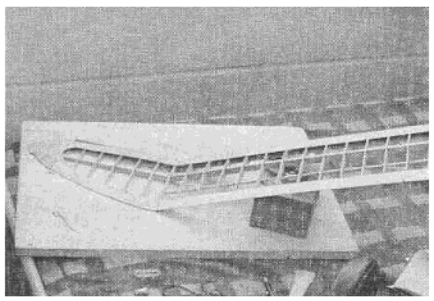
A perspective view of the wing's main panel.



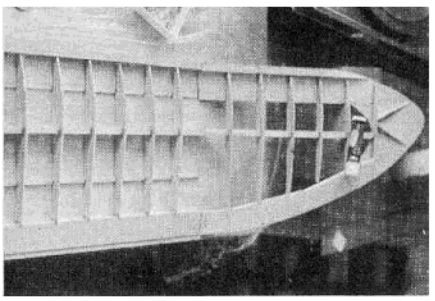
The right wing tip in its early construction stages. Notice the tapered spar.



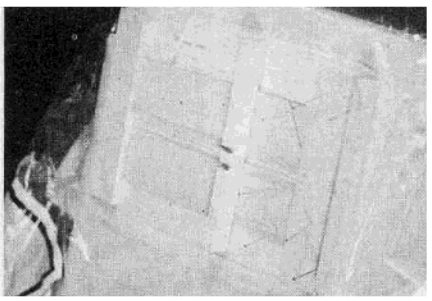
Sheet planking of tip is shown.



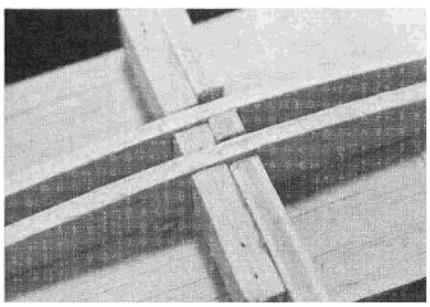
The tip panel dihedral is being applied.



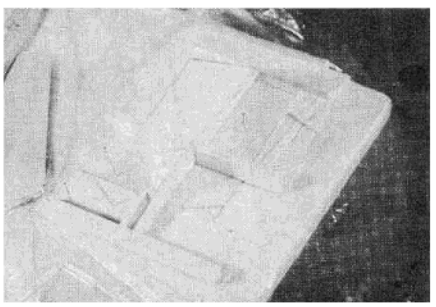
Braced up to its 4½" polyhedral, the right tip panel is shown cemented to the wing's main panel.



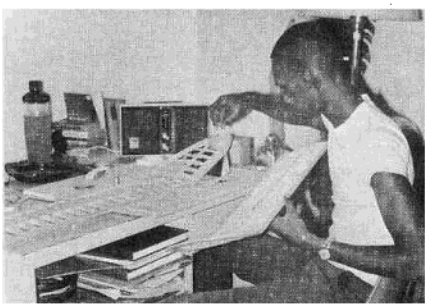
The basic foundation of the center panel is shown being cemented down. The cuts to receive the ribs bracing the pylon can be seen.



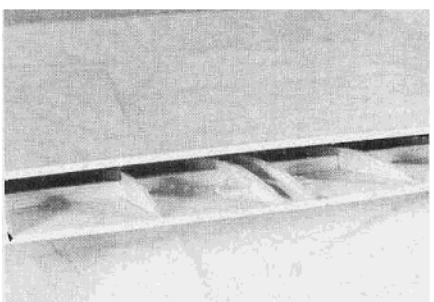
This extreme close–up of the center panel section reveals the complex specialties of the dihedral brace, power pod bracing ribs, and odd cuts in the plywood brace.



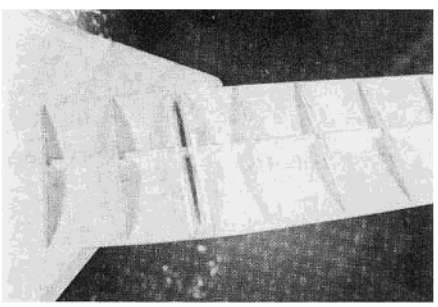
Position of the pylon mount in the center panel is featured in this shot.



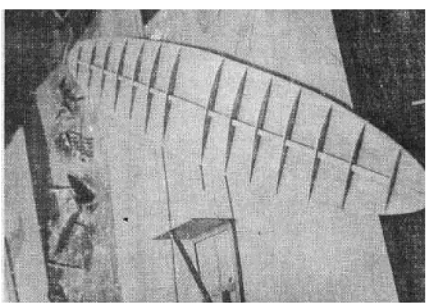
One type author fighting the balsa bugs. Compare the drawing board to the wing which overlaps even the desk.



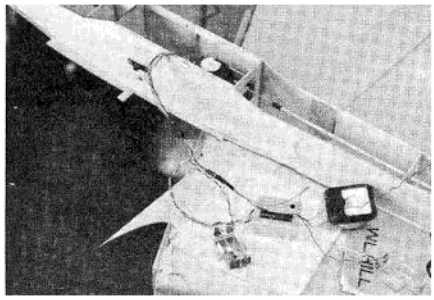
The stabilizer is truly sheet constructed as we see the top sheeting being glued down. However, at the moment it looks like a balsa clam!



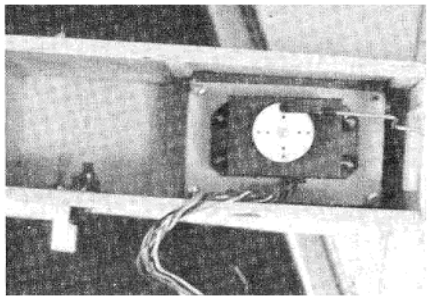
Before the top sheeting is applied this shot of the stabilizer is shown along with the plywood squares which will receive the stabilizer mounting screws.



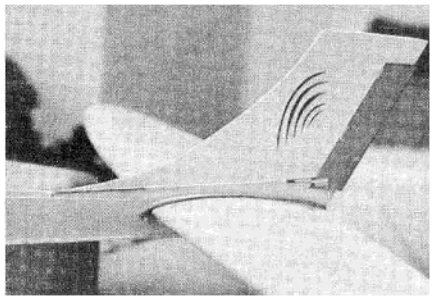
As with the wings, a multiplicity of ribs is provided to assure a strong structure and anti–warp resistant panel.



The radio gear innards of the ship is seen before it is installed in proper compartments.



A Royal rudder servo is the mechanical device used in the ship.



Detail of the complete tail section.

the strip on top of the planking at the place shown on the plans. Pin the ¼" x ½" and 1/8" square spars in place and fit the ribs into place, one by one, to see if they fit properly. For the tapered section of the wing, make the required taper in the main spar. The best glue to use in the construction of the wing is a good grade of white glue or Titebond glue. Now all of the ribs can be glued down, except the end ribs where braces and additional ribs will be added. When you build the main panels, let them dry for at least twenty-four hours before removing them from the pinned position. With the tip panels, each one will have to be built separately, first building the one shown on the plans, then turning the plans over to construct the opposite panel. Particular interest should be taken in the trailing edge of the tips since it is a built-up strip of balsa from the ¼" x 1" tapered strip. As with the main spar, the trailing edge has to be tapered slightly more than normal to correspond with the smaller ribs at the tip. To do this, finish the entire panel, then sand off the excess wood, but for now let it remain so that the top planking of the panel can be accomplished. It should be noted that at the very tip of the panel the 1/16" sheeting is spliced together to cover the areas on the top and bottom.

The center panel of the wing must be strong and rugged since it will receive the motor pod. As with the other sections of the wing, start construction by pinning down the ¼" x 1" trailing edge. Next, lay down the 1/16" sheeting at the leading edge, then glue down the 5/16" square strip. While drying, take some 1/16" sheeting and cut it to fit the sheeting that are shown on both sides of the power pod slot. If cut correctly, the sheeting will leave a 3/16" wide slot for the plywood pod. At this time, you can glue down the main spar which is slotted with two grooves in order to receive the bracing ribs. Once pinned to the construction, the 3/16" x ½" plywood brace should be glued to the front of the main spar, carefully aligning the grooves. Similarly, the 1/8" sheet plywood braces at the front of the trailing edge and back of the leading edge should be glued into place. For the joints in this section, do not be afraid to be a little liberal with the glue. After the braces have partially dried for several minutes, fit the 3/32" sheet brace ribs next to the pod and glue them down. Slip the plywood pod in its slot for proper alignment when you are gluing the ribs. The ribs at the end of the center panel will have to be added only after the wing sections are joined together. While the center panel is drying, you can join the left or right main panel to one side of the section. Begin by cutting the first two ribs in the main panel where they join the spar so that they can accept the 3/16" wide plywood dihedral brace. Put a liberal amount of glue on the braces and pin the wing half to the braces after blocking up the tip to the required dihedral as shown on the plans. The entire construction should be allowed to dry overnight. An overnight drying of all the panels is also recommended when joining them to the braces. The final task on the wing, after you have joined the panels, is to insert the plywood pod in its slot with a more-than-generous amount of glue and to add the top planking to the leading edge and tips.

Constructed of sheet, the stabilizer is quite an easy job to accomplish. Select two 3/32" x 6" sheets; one medium hard and the other one very soft. Take a straight edge and mark a long, straight line down the center of the sheeting, lengthwise and chord-wise. Using the outline on the plans, trace the form of the stab on the medium hard sheeting. Pin this bottom sheeting down to your building board, making sure that you understand in which direction is the front of the stab. Taper a ¼" square strip to the outline of the stab spar shown on the plans. Apply some glue to this spar and lay it directly on the line drawn on the wood. Now, trace all the outlines of the stab ribs on to a 3/32" balsa sheet and proceed to cut them out. You will have to sand the two identical ribs individually to assure that they are the same as the original. Glue down all of the ribs to the spar and make sure that they are properly aligned. In your spare time, take three sheets of 1/8" sheeting and glue them together to make a rough from of the rudder. Let both the stab and rudder dry overnight. Then trace the outline of the rudder on the sheeting and cut it out to shape. It will have to be sanded and covered with Japanese tissue before gluing it to the stab. Better still, if you can completely paint it, this will reduce the chance of warping when painted later on. In any case, install the rudder on the center line of the stabilizer and block it up with 1/8" square balsa strips to strengthen its drying position. Add the plywood squares to the position shown on the plans; they should be predrilled with a tiny hole. After several hours of drying, the entire stab can be planked on top. Do bevel the ends all around the sheeting to insure a perfect fit of the top and bottom planking. It is very important that the stab be thoroughly pinned down and allowed to dry overnight.

Covering and finishing is a personal taste, therefore, it's "your own thing" However, do strive for a lighter aft section because of the long tail moment. Install your favorite radio gear and make sure that your pushrod is not binding. Check the balance point of the model and see that it is the same as on the plans. When flying the Super Sonic Soarer, you will find that not too much rudder control is needed during the power portion of the flight, but will be necessary for the glide portion. If you have taken care in your construction, you will have a tremendous soaring glider that will teach you what glider flying is all about. ●